# TECHAMERICA SETTING THE PACE FOR PROCESS INTEGRATION

## 43rd Engineering Technology Management Conference

Greg Saunders
Director, Defense Standardization Program Office

# Outline

- Impact of Acquisition Reform on AT&L
- DDR&E Imperatives & Catechism
- Systems Engineering
- Defense Standardization Realignment
- DSP – What We Do
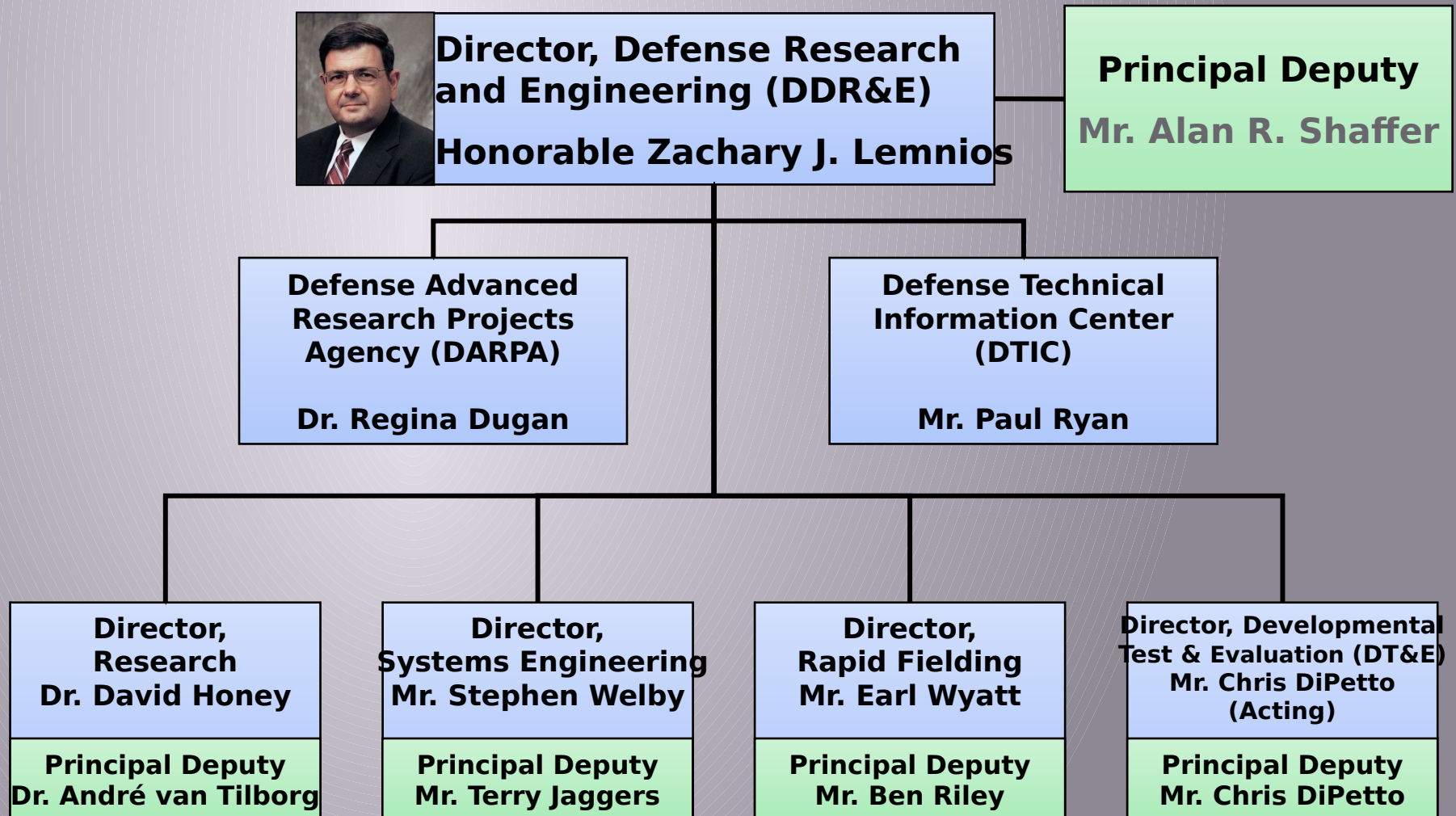- DSP – Initiatives
- Setting the Pace

# Impact of Acquisition Reform Legislation on AT&L

- Establishes Director, Systems Engineering (D, SE) and Director, Developmental Test and Evaluation (D, DT&E) as principal advisors to the Secretary of Defense and the USD(AT&L) on systems engineering and development planning and on developmental T&E, respectively

- Mandates documented assessment of technological maturity and integration risk of critical technologies for MDAPs during the Technology Development (TD) phase

- Establishes D, DT&E and D, SE joint tracking and Congressional reporting on MDAP achievement of measurable performance criteria

- Mandates competitive prototyping and MDA completion of a formal Post-Preliminary Design Review Assessment for all MDAPs before MS B; additional MDA certification to both at MS B

- Strengthens technical analysis of cost and schedule breaches during the Technology Development (pre-MS B) and the Engineering and Manufacturing Development (post-MS B) phases



**Honorable Ashton B. Carter**
Under Secretary of Defense for Acquisition, Technology & Logistics

# DDR&E Organization



**Director, Defense Research and Engineering (DDR&E)**

**Honorable Zachary J. Lemnios**

**Principal Deputy**

**Mr. Alan R. Shaffer**

**Defense Advanced Research Projects Agency (DARPA)**

**Dr. Regina Dugan**

**Defense Technical Information Center (DTIC)**

**Mr. Paul Ryan**

**Director, Research**
**Dr. David Honey**

**Principal Deputy**
**Dr. André van Tilborg**

**Director, Systems Engineering**
**Mr. Stephen Welby**

**Principal Deputy**
**Mr. Terry Jaggers**

**Director, Rapid Fielding**
**Mr. Earl Wyatt**

**Principal Deputy**
**Mr. Ben Riley**

**Director, Developmental Test & Evaluation (DT&E)**
**Mr. Chris DiPetto (Acting)**

**Principal Deputy**
**Mr. Chris DiPetto**

# Who We Serve

- Our Men and Women in Harms Way
  - Deliver overwhelming capabilities in a timely way
- Our Nation
  - Develop technologies and capabilities to ensure national security
- The Taxpayer
  - Ensure that the technologies and capabilities are developed in a cost effective way
- The AT&L Enterprise
  - Leadership of Science & Technology (S&T), Systems Engineering (SE) and Developmental Test & Evaluation (DT&E) communities
  - Shorten delivery time of "leap ahead" capabilities for the Nation
  - Lead the initiation of discovery, development and delivery of advanced technology concepts, demonstrations and prototypes for improved military capabilities

# The "Heilmeier Catechism"

1. What are we trying to do?  What is the problem we are trying to solve?

2. How is it done today, and what are the limitations of current practice?

3. What is new in our approach, and why do we think it will be successful?  What gives evidence that it will work?

4. Assuming we are successful, what difference does it make?

5. How long will it take, how much will it cost, and what are the mid-term and final exams?

Dr. George Heilmeier

DARPA Director, 1975-1977

# DDR&E Imperatives

- Accelerate delivery of technical capabilities to win the current fight.

  - Solve the most difficult near term problems and transition compelling concepts to the warfighter.

- Prepare for an uncertain future.

  - Shape the Department's science and technology investments to open options that counter (and create) strategic surprise.

- Reduce the cost, acquisition time and risk of our major defense acquisition programs.

  - Provide systems engineering leadership, deep system analysis and technical assessments across the Department.

- Develop world class science, technology, engineering, and mathematics capabilities for the DoD and the Nation.
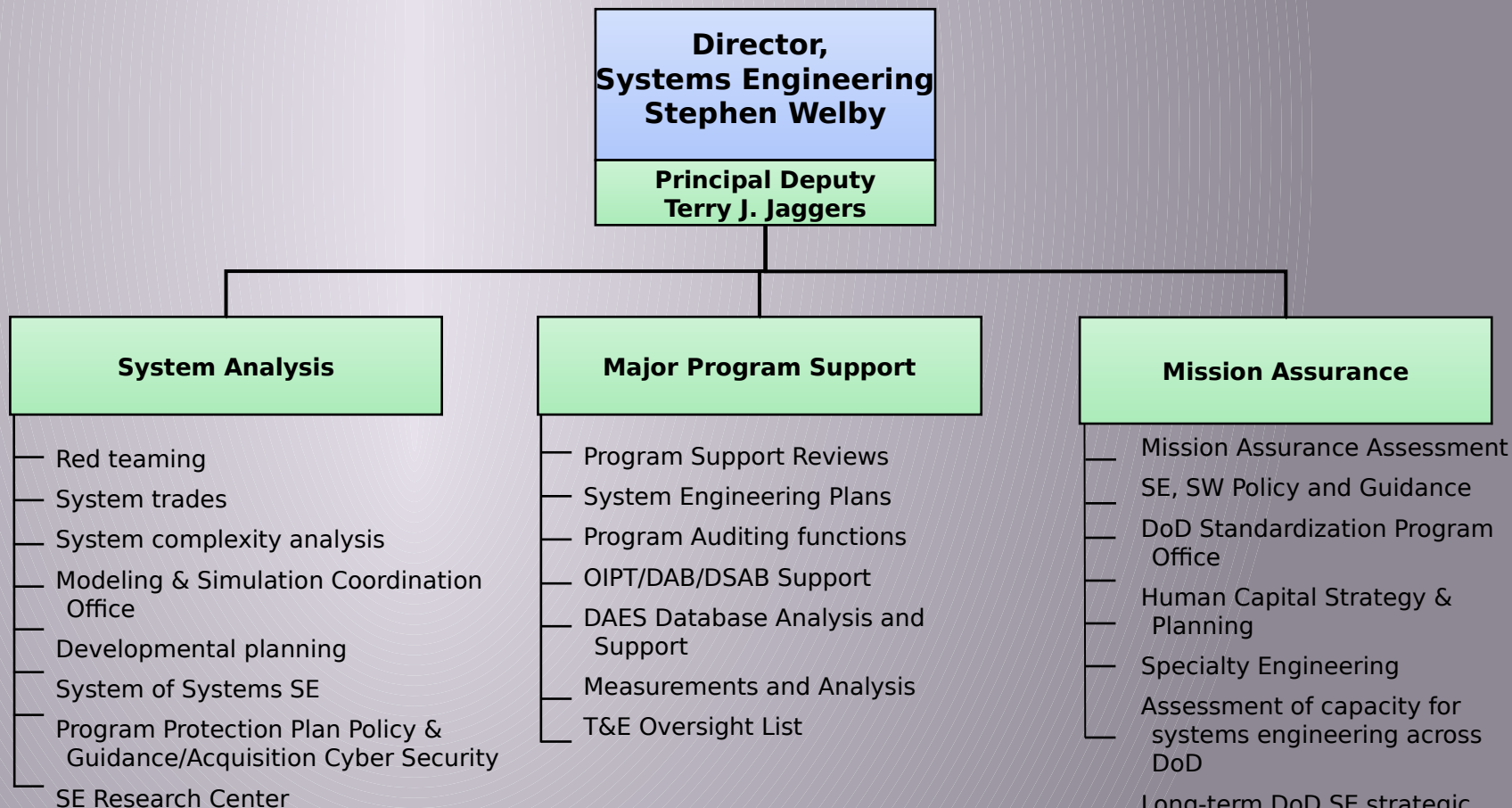
# Key Technical Areas

- Cyber Strategy
- Chemical, Biological, Radiological, Nuclear, and Explosive (CBRNE)
- Quantum Information Systems
- Space Systems…
- Energy
- Directed Energy Weapons (DEW)
- Systems Engineering support
- Software Engineering support
- Developmental Test & Evaluation (DT&E) support
- Near term practical solutions
  - Force protection – MRAP
  - Forward Operating Base (FOB) protection
  - Aircraft survivability equipment (ASE)
  - Lines of communication security
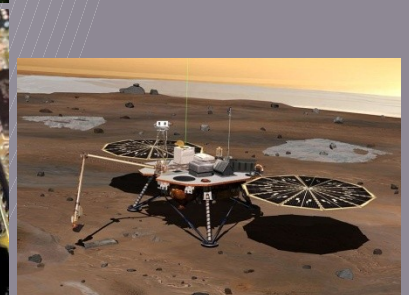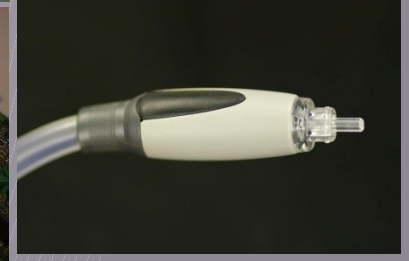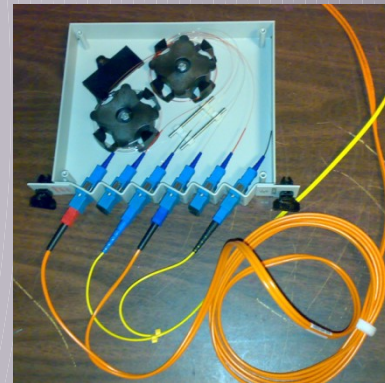
The Next Big Thing!

# Director, Systems Engineering Organizational Structure

**Director, Systems Engineering**
**Stephen Welby**

Principal Deputy
Terry J. Jaggers

## System Analysis

- Red teaming
- System trades
- System complexity analysis
- Modeling & Simulation Coordination Office
- Developmental planning
- System of Systems SE
- Program Protection Plan Policy & Guidance/Acquisition Cyber Security
- SE Research Center

## Major Program Support

- Program Support Reviews
- System Engineering Plans
- Program Auditing functions
- OIPT/DAB/DSAB Support
- DAES Database Analysis and Support
- Measurements and Analysis
- T&E Oversight List

## Mission Assurance

- Mission Assurance Assessment
- SE, SW Policy and Guidance
- DoD Standardization Program Office
- Human Capital Strategy & Planning
- Specialty Engineering
- Assessment of capacity for systems engineering across DoD
- Long-term DoD SE strategic

**Responsible to provide technical support, systems engineering (SE) oversight, program development and mission assurance certification to USD(AT&L) in support of planned and ongoing acquisition programs**

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# Mr. Steve Welby

- Uniquely broad background in technology and program management including development of advanced aeronautical and space systems, high energy lasers, ground and maritime systems, robotics, advanced weapons, high-performance software, real-time signal and image processing, and military sensor systems.

- Background:
  - *Raytheon Missile Systems, Deputy, Advanced Programs*
  - *Aerospace and Defense Consultant*
  - *DARPA, Director, Tactical Technology Office*
  - *DARPA, Deputy Director, Information Exploitation Office*
  - *DARPA, PM, Info. Systems & Special Projects Offices*
  - *US Army Research Laboratory, Engineer*

- Education:
  - *MS Computer Science, The Johns Hopkins University*
  - *MS Applied Mathematics, The Johns Hopkins University*
  - *MS Business Administration, Texas A&M University,*
  - *BS Chemical Engineering, The Cooper Union for the Advancement of Science and Art*

# Critical SE Activities

What are the critical SE activities that occur between initial design to IOT&E?
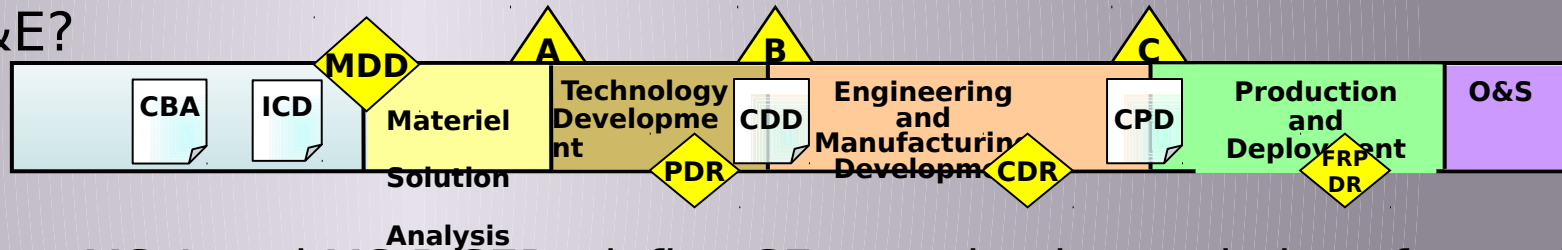


MS A and MS B SEPs define SE organization and plans for each MDAP

| | |
|---|---|
| Systems Engineering Plan[1] | Prepare a SEP for each Milestone Review |
| | Support the Technical Development Strategy (TDS) |
| | SEP supports Technical Reviews |
| | SE Implemented as Prescribed in SEP |
| Systems Engineering Leadership[1] | Each PEO has a Chief Systems Engineer |
| | Provisions for SE on Contracts/RFPs |
| Technical Reviews[1] | Event-Driven; Conducted in Accordance with the SEP |
| | PDR and Post-PDR Assessment Report |
| | Critical Design Review (CDR) and Post-CDR Report |
| RAM[2] | SE Principles Applied to Enhance RAM |
| | RAM Requirements Included in RFPs |
| | Robust Program for RAM Improvement |
| | RAM Requirements are Identified in JCIDS |
| Lifecycle Management | Sustainment metrics outlined in SEP |
| | PBL strategy outlined in SEP |

[1]*5000.02 Enclosure 12*
[2]*Weapon Systems Acquisition Reform Act*

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# DOD Standardization Executive Realignment

- Transfer from OSD Logistics to OSD Systems Engineering
- Why? - Weapons Systems Acquisition Reform Act of 2009 Requires Director of Systems Engineering
  - Provide systems engineering principles & best practices to enhance reliability, availability, & maintainability of defense systems
    - Specifications & standards are key systems engineering process <u>inputs</u> to define requirements
    - Specifications & standards are key systems engineering process <u>outputs</u> to establish product baselines and measure compliance

# DOD Standardization Executive Realignment

- Benefits of transfer – Director, Systems Engineering will set DoD-wide strategic direction for standards
  - Standards are a foundation of systems engineering
  - Standards reduce risk and cost in programs
  - Standards document & communicate lessons learned, interoperability, and technologies across entire sectors to form a common understanding
- When? – Soon

# DOD Standardization Realignment

Director
Systems Engineering
Stephen Welby

Deputy Director
Mission Assurance
Nicholas Torelli

Director
Defense Standardization
Program Office
Greg Saunders

# Standardization Creates Benefits

- Total Life Cycle Systems Management considerations are incorporated  through standards and standardization
- Interoperability, for Joint and Coalition operations, is enabled
- Logistics footprint is reduced
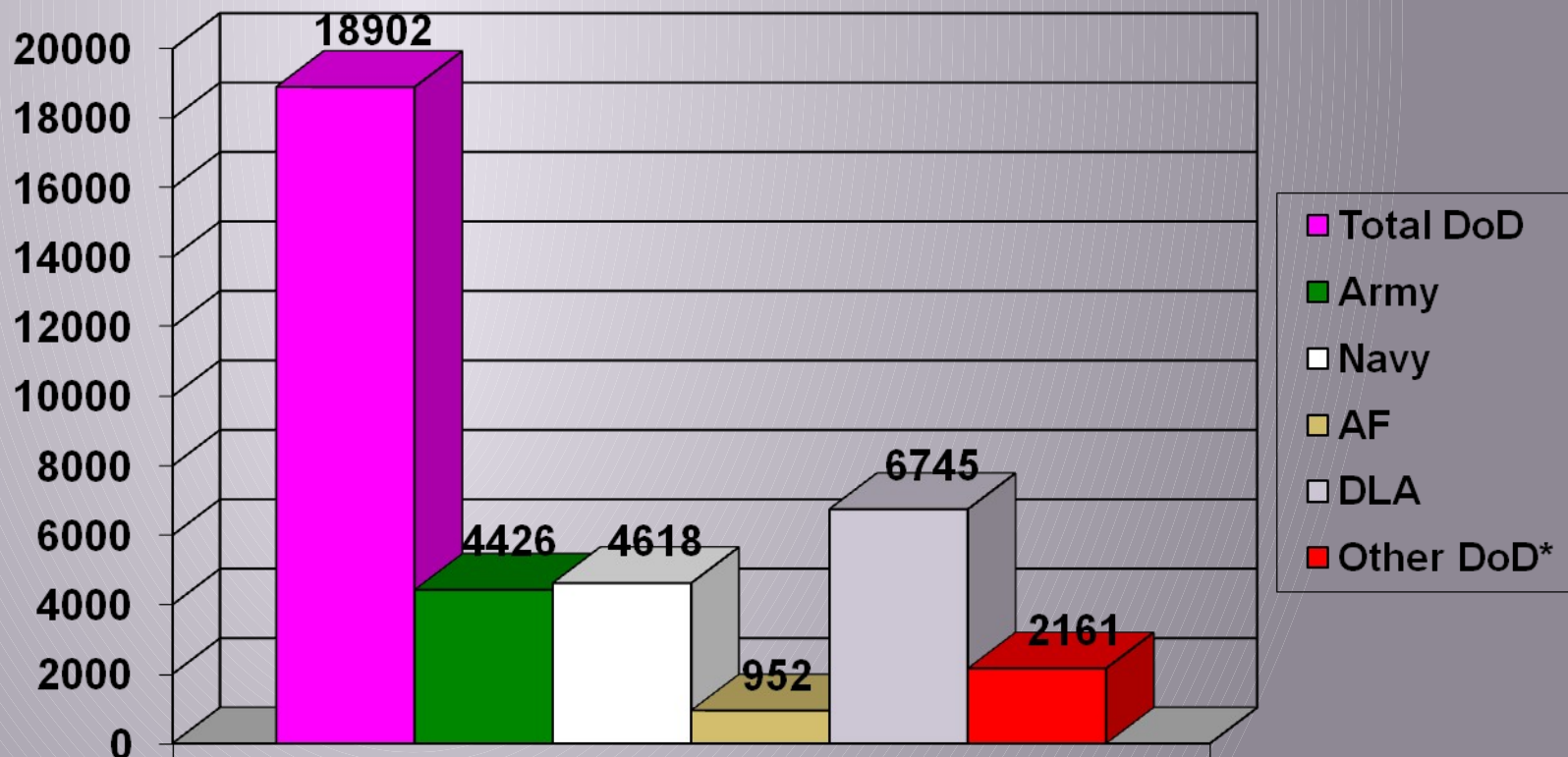- Reliability, Safety, Availability, Maintain-ability Increase

# Standardization Achieves Results

- Life cycle costs were reduced $80 million dollars by standardizing to reduce parts on the Virginia class submarine from over 100,000 to less than 15,000.

- Weapons systems integration costs are reduced 40% and fielding of new systems accelerated 1-3 years when Air Force developed a universal interface that transforms the armament integration process from a program centric approach to a capabilities based process.

- A standard, commercial low voltage power supply in the Patriot Missile increased potential suppliers to 46, increased Mean Time Between Failure 100-300%, decreased procurement costs 30-40%, decreased Repair costs 90%, and addressed diminishing manufacturing source problems.

- 30,000 NATO troops from NATO nations operate in Afghanistan supported through multiple NATO Standardization Agreements

- A NAVAIR Team recommended resolutions for DMSMS cases - $16M saving / $15M avoidance:
  - Four COTS Circuit cards For the ASQ-225 ACIS – four COTS circuit cards - cost avoidance $3.6M.
  - For V-71, assisted in the requirement definitions and contract negations - anticipated cost savings of $16M over 5 years.
  - Provided PMAs with a Cost Estimation Template for Defining DMSMS POM requirements,
  - For PMA-231 (E2/C2) research completed on procurable NEC V-25 chip - cost avoidance of 1.5 million.
  - For PMA-207 (C-130T) SDRR found to be sustainable with a cost avoidance $10M.

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# Number of Active Documents Prepared by DoD**

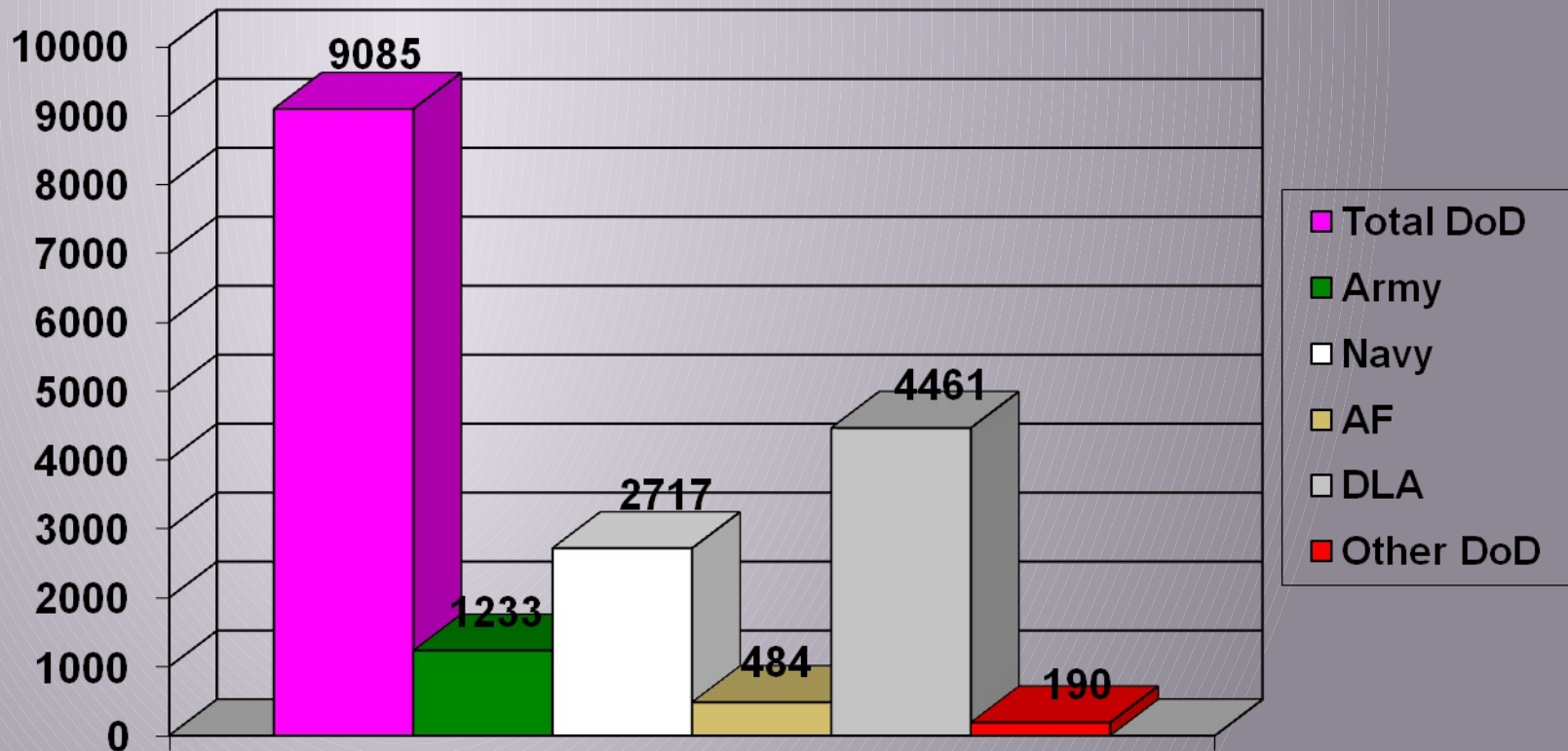**(Includes military & federal specifications, standards, handbooks, commercial item descriptions, data item descriptions, and guide specifications)**



Chart data:

| Category | Value |
|----------|-------|
| Total DoD | 18902 |
| Army | 4426 |
| Navy | 4618 |
| AF | 952 |
| DLA | 6745 |
| Other DoD* | 2161 |

*Other DoD includes Defense Medical Board, DISA, NGA, DTRA, NSA, DIA, & OSD
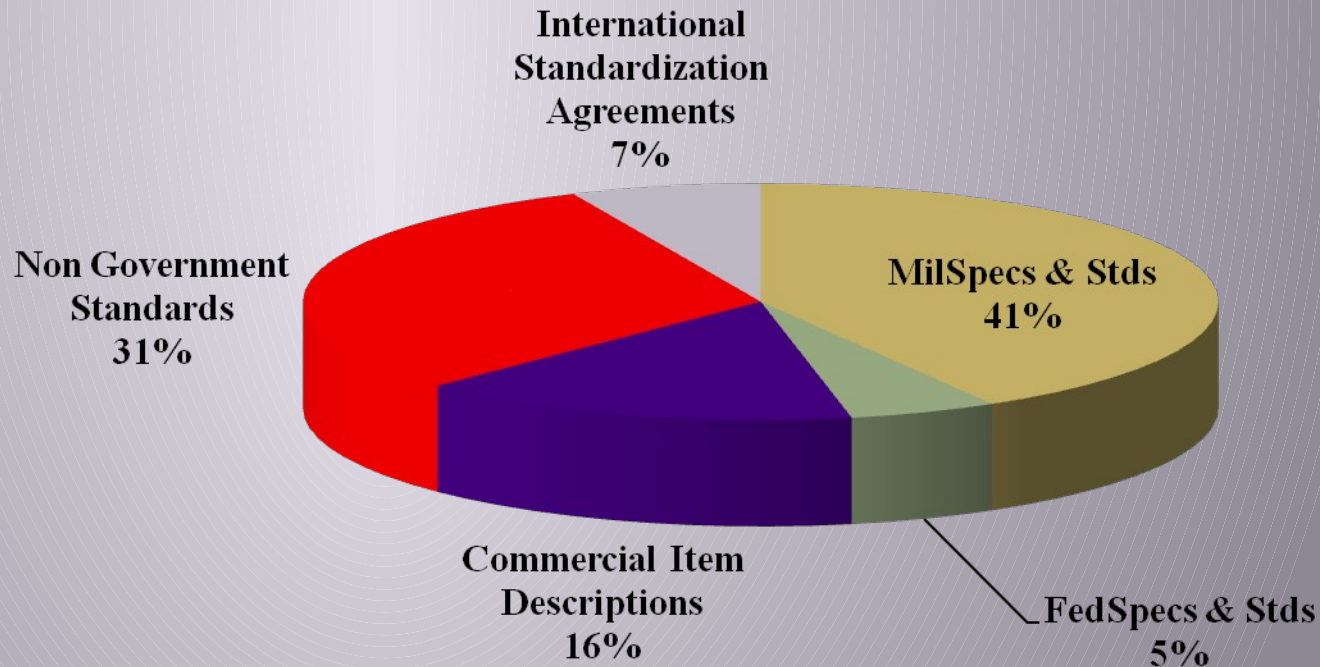** As of April 7, 2009

# Number of DoD-Adopted Non-Govt Stds*



*As of April 7, 2009

# 1,000s of Commercial and Military Specs/Stds Used in Weapon Systems
**(Over 31,000)**



International Standardization Agreements 7%

MilSpecs & Stds 41%

FedSpecs & Stds 5%

Commercial Item Descriptions 16%

Non Government Standards 31%

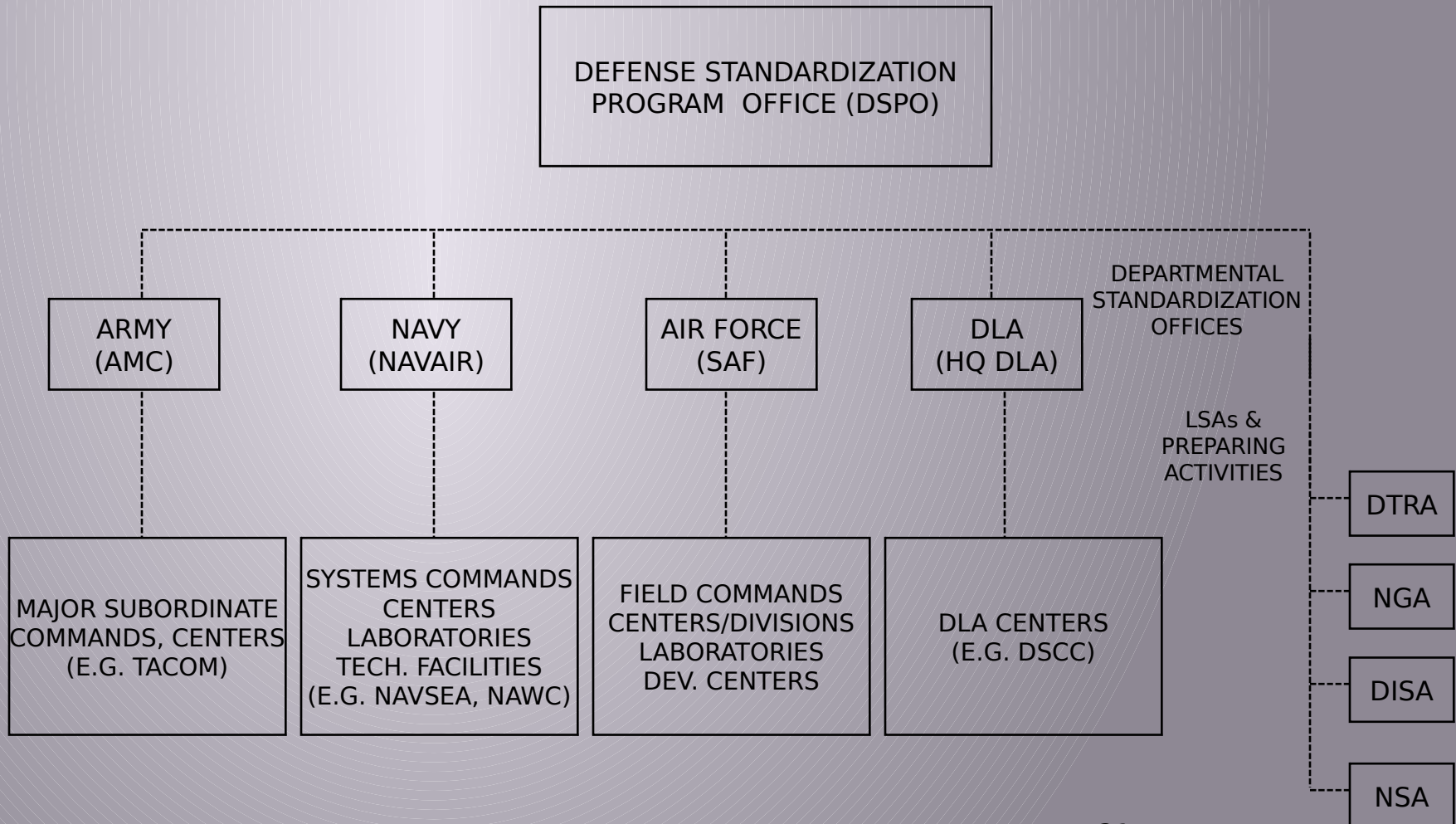- M-1 Tank                 cites           5,762 Specs/Stds
- Apache                   cites           8,141 Specs/Stds
- C-5 Galaxy               cites           13,338 Specs/Stds
- F110 Engine             cites           2,468 Specs/Stds
- Tomahawk Missile     cites          1,876 Specs/Stds
- F-14 Tomcat             cites           15,254 Specs/Stds

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- Mil-F-5509                       used on     641 Weapon Systems
  - Flared Tube Fitting
- SAE-AMS7276              used on     505 Weapon Systems
  - High-Temp Low Compression FKM Rubber Fluid Sealing Ring
- Mil-C-38999              used on     606 Weapon Systems
  - Quick Disconnect Electrical Connector, Environment Resistant

# Standardization Execution is Decentralized

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                    ┌──────────────────────────────┐
                    │   DEFENSE STANDARDIZATION     │
                    │   PROGRAM  OFFICE (DSPO)      │
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| ARMY (AMC) | NAVY (NAVAIR) | AIR FORCE (SAF) | DLA (HQ DLA) | DEPARTMENTAL STANDARDIZATION OFFICES |
|---|---|---|---|---|

LSAs & PREPARING ACTIVITIES

| MAJOR SUBORDINATE COMMANDS, CENTERS (E.G. TACOM) | SYSTEMS COMMANDS CENTERS LABORATORIES TECH. FACILITIES (E.G. NAVSEA, NAWC) | FIELD COMMANDS CENTERS/DIVISIONS LABORATORIES DEV. CENTERS | DLA CENTERS (E.G. DSCC) |
|---|---|---|---|

DTRA

NGA

DISA

NSA

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# Defense Standardization Program Office (DSPO) Provides Support

| TOOLS | TRAINING AND EDUCATION | JOINT AND SERVICE SPECIFIC EFFORTS | COALITION EFFORTS | STANDARDS DEVELOPMENT ORGANIZATIONS |
|---|---|---|---|---|
| ☐Acquisition Streamlining and Standardization Information System (ASSIST)<br><br>☐Government Industry Data Exchange Program (GIDEP)<br><br>☐Diminishing Manufacturing Sources and Material Shortages (DMSMS) Knowledge Sharing's Portal<br><br>☐Guide Books<br><br>☐Weapon System Information Tool (WSIT) | ☐Defense Standardization Annual Conference<br><br>☐DAU Led Courses<br><br>☐Continuous Learning Modules<br><br>☐Defense Standardization Program Journal<br><br>☐DSPO Led Courses<br><br>☐Case Studies<br><br>☐Industry Conferences<br>　■AIA<br>　■Aging Aircraft<br>　■DMSMS<br>　■ARSSG | ☐Defense Standardization Council<br><br>☐Joint Standardization Boards<br><br>☐Annual Defense Standardization Program Awards<br><br>☐Parts Managements & Qualification | ☐**NATO –** operational, materiel, and administrative standards<br><br>☐**ABCA -** Australia, Britain, Canada, America – mostly land based standards<br><br>☐**AUSCANZUKUS** -Australia, Canada, New Zealand, United Kingdom, USA – mostly naval standards<br><br>☐**ASIC** - Air and Space Interoperability Council<br><br>☐**CCEB** - Combined Communication Electronics Board | ☐**ANSI** - American National Standards Institute<br>☐**ISO** – International Standards Organization<br>☐**IEC** – International Electrotechnical Commission<br>☐**ASTM International**<br>☐**SAE -** Society of Automotive Engineers<br>☐**AIA** – Aerospace Industries Association<br>☐**AIAA** – American Institute of Aeronautics and Astronautics<br>☐**GEIA/AEA** – Electronic Industries Alliance<br>☐**IEEE** – Institute for Electrical and Electronic Engineering |

# DSP Tools Help Program Offices To:

- Select most appropriate requirements for their application - **ASSIST**
  - Provides a way to search for and download Mil Specs and Stds, create custom reports, contact key DoD personnel, and monitor standardization projects. An Alert Service notifies users when changes are made to--or planned for--documents of interest. This management system supports DoD Standardization in establishing projects, coordinating documents, obtaining project and document numbers, and submitting documents for indexing. It is a portal for DoD users to access such applications as the Program Manager's Tool (PMT) and Weapon Systems Impact Tool (WSIT).

- Mitigate risks of unavailability of obsolete products - **GIDEP**
  - Provides web access to fact-based information from across the federal government and its industry partners on non-conforming parts and processes (faulty, defective, fraudulent, counterfeit); DMSMS (obsolescence notices and solutions); a variety of engineering, reliability and maintainability databases; and metrology and calibration information.  Also, provides access to a network of subject matter experts on above topics throughout government and industry.  GIDEP's mission is to enhance safety and readiness and reduce total ownership cost across the research, development, acquisition and support lifecycle.

- Respond to changes in technology - **WSIT**
  - Provides cross reference information relating Specifications and Standards to the weapon systems they support.

# DSPO Guidebooks
# Provide Helpful Procedures for:

- **SD-2 – Buying Commercial and NonDevelopmental Items** provides guidance on the technical aspects of specifying, researching and buying commercial and NDI products to meet Defense needs at lowered developmental, reliability, and cost risk.

- **SD-9 – DoD Interaction with NonGovernment Standards Bodies** provides guidance on effective participation with NGSBs and on adoption of industry standards such as ASTM, SAE, IEEE, AIA, ASME, and 90 others.

- **SD-19 – Life Cycle Savings through Parts Management** provides advice and guidance on establishing effective parts management programs to reduce logistics footprint and life cycle costs.

- **SD-21 – Specifications Mandated for Use** lists and provides reference information on Specs and Standards mandated for use by law, executive order, or DoD direction.

- **SD-22 - The DMSMS Guidebook** is a compilation of the best proactive practices from across the DOD for managing the risk of obsolescence. The guidebook addresses both electrical and mechanical parts obsolescence issues. Program Managers should make this guidebook the desktop reference to quickly pinpoint key actions required in managing DMSMS issues and concerns.

- **SD-23 – Item Reduction Program** provides guidance for eliminating duplicative items from DoD stock.

# Joint Standardization Boards
## Benefit Services and the Department

- Responsible for defining enterprise-wide standardization objectives and strategies for a designated commodity area

- Current Joint Standardization Boards (JSB)
  - Aerial Refueling Systems
  - Fuze/Initiation Systems
  - Intermodal Equipment
  - Medical Materiel/Equipment
  - Microcircuits and Semiconductors
  - Mobile Electric Power (MEP) Generating Sources
  - Power Source Systems
  - Tactical Rigid Wall, Soft, and Hybrid Shelters
  - Tactical Unmanned Aircraft Systems

# NATO Standardization Supports Coalition Interoperability

- NATO Committee for Standardization – Support Head Of Delegation.
- Allied Committee 327 – Life Cycle Systems Management:
  - Provide support
  - Coordinate documents for ratification
- Civil Standards Management Working Group – Chair working group.
- Standardization Document Management Working Group – US Member.
- Standardization Within NATO Training Course for US participants.
- Participate on European Defense Agency's Material Standards Harmonization Team

# DSP Initiatives

- Revise Mil-HDBK-217 – Reliability Prediction
- Re-engineer Parts Management
- Automate Qualified Products Database
- Establish DMS/MS Evaluation Criteria
- Revive GIDEP – Tool for Managing Counterfeit
- Make STANAGS Available
- Improve Automated Tools
- Make JSBs Pay Off
- Publicize Success

essential [to the defense of the Republic] that the same species of arms utrements, and military apparatus should be introduced in every part of United States.  No one, who has not learned it from experience, can conc difficulty, expense, and confusion, which result from a contrary system." *ral George Washington, 1783*

erican mass production, made possible by standardization, was our num weapon in World War II."  *W. Edwards Deming, "Out of the Crisis"*

Standardization can be a tremendous force multiplier.  If the level of tandardization is adequate, then the overall efficiency of combined orces will be greater than the sum of individual components." *dmiral Jan Eriksen, Director, NATO Standardization Agency, "European Affairs, ummer 2002 Issue*